■ Models with logistic T cell growth

Since the robust qualitative affect of crHIV-1 introduction depends upon the growth characteristics of the T reservoir (i.e. parameters λ and d), we explored the effect of altering this growth rate. Logistic growth is commonly used in biological models to describe population grwoth in a more realistic manner than constant or exponential growth, since it assumes a limitation of resources and limits population growth aboce a set threshold value. Logistic growth has been considered in the context of the Basic Model (Nelson and Perelson, 1999), but is usually assumed to have a small affect and is thus ignored. We explored two forms of logistic growth, for T cells, into the Basic Model: a form that limits growth when only T cells approach the threshold value T_{max} and a form that limits growth when $T + I_T$ approaches the threshold T_{max}. T_{max} was assumed to be between 2000 and 4000 cells/μl of blood. We performed dynamic simulations using the distributed delay model above since algebraic steady state analysis was not practical. The equations are as above in the distributed delay section except that the T equation is as follows:

$$\dot{T} = \lambda + r\,T\left(1 - \frac{T}{T_{max}}\right) - d\,T - k\,V\,T - k\,V_T\,T$$

or

$$\dot{T} = \lambda + r\,T\left(1 - \frac{T+I_T}{T_{max}}\right) - d\,T - k\,V\,T - k\,V_T\,T$$

We tested an array of r values between $0.001 - 0.1$ and an array of T_{max} values between $2000 - 4000$ cells / μL.

The decrease in HIV-1 set point was not qualitatively affected by either of these alterations to the model.